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Department of Medicine  
Channing Division of Network Medicine

## Channing Network Science Seminar

Nov 14, 2014, 11am @ 5th-floor Conference Room



**Speaker: Lei Dai, Ph.D**

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MIT

### Spatio-temporal Dynamics Before Population Collapse

**Abstract:** Population collapse and catastrophic thresholds in many complex systems may correspond to a tipping point in the system, i.e. a fold bifurcation in the language of nonlinear dynamical systems theory. Theory predicts that in the approach of tipping points a system would recover more slowly from perturbations, a phenomenon known as critical slowing down. Thus, we may be able to forecast an upcoming catastrophe by measuring how a system responds to perturbations. This gives hope to developing a toolbox of generic early warning signals before tipping points. My research has combined theory in critical transitions with experimental microbial systems to investigate the spatio-temporal dynamics before population collapse. In particular, I demonstrate that a set of warning indicators based on critical slowing down can be used to assess the fragility of populations.

**Short bio:** Lei received his Ph.D. in Biophysics at MIT while working in Jeff Gore's lab of Ecological Systems Biology. Prior coming to MIT, he studied at University of Science and Technology of China. Currently Lei is a postdoc in Arup Chakraborty's group at MIT, where he is exploring fitness landscapes of HIV with statistical models. In 2015 he will start a postdoc position at UCLA Medical School to characterize the evolution of RNA viruses using high-throughput sequencing.

hosted by: Yang-Yu Liu